

WHAT IS CLAIMED IS:

1. A semiconductor array device having a semiconductor layer disposed on a current-blocking layer, the semiconductor layer being partly covered by a dielectric film, the semiconductor layer being divided into a plurality of mutually isolated parts, the semiconductor array device comprising:

a first interconnecting pad overlying and electrically coupled to one of the mutually isolated parts of the semiconductor layer;

a second interconnecting pad disposed on the dielectric film;

a first group of semiconductor circuit elements disposed in one or more of the mutually isolated parts of the semiconductor layer, having respective electrodes that are electrically coupled to the first interconnecting pad by first conductive paths passing through the semiconductor layer; and

a second group of semiconductor circuit elements disposed in one or more of the mutually isolated parts of the semiconductor layer different from the parts in which the first group of semiconductor circuit elements are disposed, having respective electrodes that are electrically coupled to the second interconnecting pad by second conductive paths insulated from the semiconductor layer by the dielectric film, at least one of the second conductive paths crossing at least one of the first conductive paths at a point at which said one of the first conductive paths passes through the semiconductor layer.

2. The semiconductor array device of claim 1, wherein the first group of semiconductor circuit elements are interspersed among the second group of semiconductor circuit

elements to form a substantially linear array of semiconductor circuit elements.

3. The semiconductor array device of claim 2, wherein the second conductive paths include a shared interconnecting line extending parallel to the substantially linear array, the shared interconnecting line crossing the first conductive paths at points at which the first conductive paths pass through the semiconductor layer.

4. The semiconductor array device of claim 3, wherein the second conductive paths also include respective interconnecting leads connecting the shared interconnecting line to the electrodes of the second group of semiconductor circuit elements.

5. The semiconductor array device of claim 4, wherein the first conductive paths include:

- a plurality of individual electrodes disposed on and electrically coupled to the semiconductor layer on one side of the shared interconnecting line, between the interconnecting leads;

- a plurality of individual interconnecting lines connecting the individual electrodes to the electrodes of the first group of semiconductor circuit elements; and

- a shared electrode disposed on and electrically coupled to the semiconductor layer on another side of the shared interconnecting line, extending parallel to the shared interconnecting line, the shared electrode being electrically connected to the first interconnecting pad, the shared electrode being electrically coupled to the individual electrodes through the semiconductor layer beneath the shared interconnecting line.

6. The semiconductor array device of claim 2, wherein the second conductive paths include a branched interconnecting line extending generally parallel to the substantially linear array, with branches leading to the electrodes of the second group of semiconductor circuit elements.

7. The semiconductor array device of claim 6, wherein at least one of the first conductive paths includes:

- an electrode pad disposed between a pair of the branches of the branched interconnecting line, the electrode pad being electrically coupled to the first interconnecting pad through the semiconductor layer; and

- an interconnecting lead connecting the electrode pad to the electrode of one of the semiconductor circuit elements in the second group of semiconductor circuit elements.

8. The semiconductor array device of claim 6, wherein pairs of semiconductor circuit elements in the first group of semiconductor circuit elements alternate with pairs of semiconductor circuit elements in the second group of semiconductor circuit elements in the substantially linear array, further comprising:

- a plurality of electrode pads electrically interconnected through the semiconductor layer, disposed between respective pairs of branches of the branched interconnecting line, each electrode pad facing a pair of semiconductor circuit elements in the first group of semiconductor circuit elements; and

- a plurality of interconnecting leads connecting the electrode pads to the electrodes of the facing pairs of semiconductor circuit elements.

9. The semiconductor array device of claim 8, wherein the first interconnecting pad is disposed on one of the electrode pads.

10. The semiconductor array device of claim 2, wherein the substantially linear array has a staggered arrangement, the first group of semiconductor circuit elements and the second group of semiconductor circuit elements being offset in mutually opposite directions.

11. The semiconductor array device of claim 2, wherein each semiconductor circuit element in the first and second groups of semiconductor circuit elements is disposed in a separate one of the mutually isolated parts of the semiconductor layer.

12. The semiconductor array device of claim 2, wherein the first group of semiconductor circuit elements is separated from the second group of semiconductor circuit elements by a meandering trench dividing the semiconductor layer into two mutually isolated parts.

13. The semiconductor array device of claim 2, wherein the first interconnecting pad and the second interconnecting pad are disposed on one side of the substantially linear array, further comprising a plurality of third interconnecting pads disposed on the dielectric film on another side of the substantially linear array, each of the third interconnecting pads being electrically coupled to a mutually adjacent pair of the semiconductor circuit elements, one semiconductor circuit element in the mutually adjacent pair belonging to the first group, another semiconductor circuit element in the mutually adjacent pair belonging to the second group.

14. The semiconductor array device of claim 13, wherein the semiconductor layer includes:

- a lower cladding layer of aluminum gallium arsenide;
- an active layer of aluminum gallium arsenide disposed on the lower cladding layer of aluminum gallium arsenide;
- an upper cladding layer of aluminum gallium arsenide disposed on the active layer of aluminum gallium arsenide;

and

- a contact layer of gallium arsenide, disposed on the upper cladding layer of aluminum gallium arsenide, making electrical contact with the electrodes of the semiconductor circuit elements.

15. The semiconductor array device of claim 14, wherein the semiconductor circuit elements have impurity diffusion regions, and the third interconnecting pads have leads making electrical contact with the contact layer of gallium arsenide in the impurity diffusion regions.

16. The semiconductor array device of claim 13, wherein the semiconductor layer includes:

- a lower contact layer of n-type gallium arsenide making electrical contact with the electrodes of the semiconductor circuit elements;

- a lower cladding layer of n-type aluminum gallium arsenide disposed on the lower contact layer of n-type gallium arsenide within parts of the semiconductor circuit elements excluding the electrodes of the semiconductor circuit elements;

- an active layer of aluminum gallium arsenide disposed on the lower cladding layer of n-type aluminum gallium arsenide;

an upper cladding layer of p-type aluminum gallium arsenide disposed on the active layer of aluminum gallium arsenide; and

an upper contact layer of p-type gallium arsenide disposed on the upper cladding layer of p-type aluminum gallium arsenide;

the third interconnecting pads having leads making electrical contact with the upper contact layer of p-type gallium arsenide in the semiconductor circuit elements.

17. An optical printing head comprising at least one semiconductor array device as recited in claim 1.

18. The optical printing head of claim 17, wherein the semiconductor circuit elements in the semiconductor array device are light-emitting elements, further comprising:

- a base for supporting the semiconductor array device;
- a rod lens array for focusing the light emitted by the light-emitting elements in the semiconductor array device;
- a holder for holding the rod lens array; and
- at least one clamp for holding the base and the holder together.

19. An electrophotographic printer comprising at least one optical printing head having at least one semiconductor array device as recited in claim 1.

20. The electrophotographic printer of claim 19, further comprising:

- a photosensitive drum selectively illuminated by the optical printing head to form a latent electrostatic image;
- a developing unit for supplying toner to develop the latent electrostatic image on the photosensitive drum; and
- a transfer roller for transferring the developed image

from the photosensitive drum to printing media.